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The Development Impact of a Best Practice Seasonal Worker Policy

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Non-Technical Abstract

Seasonal migration programs are widely used around the world, and are increasingly seen as offering a potential "triple-win"- benefiting the migrant, sending country, and receiving country. Yet there is a dearth of rigorous evidence as to their development impact, and concerns about whether the time periods involved are too short to realize much in the way of benefits, and whether poorer, less skilled households actually get to participate in such programs. We study the development impacts of a recently introduced seasonal worker program which has been deemed to be "best practice". New Zealand's Recognised Seasonal Employer (RSE) program was launched in 2007 with an explicit focus on development in the Pacific alongside the aim of benefiting employers at home. A multi-year prospective evaluation allows us to measure the impact of participation in this program on households and communities in Tonga and Vanuatu. Using a matched difference-in-differences analysis based on detailed surveys fielded before, during, and after participation, we find that the RSE has indeed had largely positive development impacts. It has increased income and consumption of households, allowed households to purchase more durable goods, increased subjective standard of living, and had additional benefits at the community level. It also increased child schooling in Tonga. This should rank it among the most effective development policies evaluated to date. The policy was designed as a best practice example based on lessons elsewhere, and now should serve as a model for other countries to follow.

Keywords: Seasonal migration; Matched Difference-in-Differences.

JEL Classification: O12, J61, F22.

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Abstract

Seasonal migration programs are widely used around the world, and are increasingly seen as offering a potential "triple-win"- benefiting the migrant, sending country, and receiving country. Yet there is a dearth of rigorous evidence as to their development impact, and concerns about whether the time periods involved are too short to realize much in the way of benefits, and whether poorer, less skilled households actually get to participate in such programs. We study the development impacts of a recently introduced seasonal worker program which has been deemed to be "best practice". New Zealand's Recognised Seasonal Employer (RSE) program was launched in 2007 with an explicit focus on development in the Pacific alongside the aim of benefiting employers at home. A multi-year prospective evaluation allows us to measure the impact of participation in this program on households and communities in Tonga and Vanuatu. Using a matched difference-in-differences analysis based on detailed surveys fielded before, during, and after participation, we find that the RSE has indeed had largely positive development impacts. It has increased income and consumption of households, allowed households to purchase more durable goods, increased subjective standard of living, and had additional benefits at the community level. It also increased child schooling in Tonga. This should rank it among the most effective development policies evaluated to date. The policy was designed as a best practice example based on lessons elsewhere, and now should serve as a model for other countries to follow.

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1. Introduction

"First and foremost it will help alleviate poverty directly by providing jobs for rural and outer island workers who often lack income-generating work. The earnings they send home will support families, help pay for education and health, and sometimes provide capital for those wanting to start a small business".

Winston Peters, New Zealand Minister of Foreign Affairs, at the approval of the RSE program, October 2006.[1]

"A guest worker program is the most effective contribution we can make to improving the lives of the world's working poor"

Dani Rodrik in a New York Times op-Ed, June 1, 2007.

International migration is probably the most effective mechanism we know to rapidly increase the incomes of poor people (Clemens et al., 2008). However, it is also one of the most controversial, with migrant-receiving countries worried about the costs of assimilating workers and their families. Temporary or circular migration programs are seen as a way of overcoming such concerns and enabling poorer, less-skilled workers to benefit from the higher incomes to be earned abroad as part of a "triple-win", whereby migrants, the sending country, and the receiving country all benefit. Such programs have been recommended as one of the most promising ways to enhance the development benefits of migration by a wide range of international organizations (UN, 2004; GCIM, 2005; World Bank 2006), national Governments (House of Commons International Development Committee, 2004) and academics (Winters et al., 2003; Pritchett, 2006, Rodrik, 2007).

Almost all OECD countries have temporary worker migration programs, with seasonal workers the largest single category, totaling 576,000 workers in 2006 (OECD, 2008). However, such programs remain controversial. This is particularly true of programs geared to low-skilled migrants, such as seasonal migration programs, as witnessed by the policy debate in the United States over a new guest worker program and continued debate in Western Europe about the role of seasonal workers. Some critics of such programs raise concerns that workers will over-stay and/or compete down the wages of native poorer workers (e.g. Borjas, 2007), while others raise concerns about the possible exploitation of workers and whether workers can earn enough to make it worthwhile if the duration of work is short.[2]

Lacking from this debate is credible evidence as to what the development impact is of international seasonal worker programs. The few existing studies are based on ex-post surveys of migrants, and lack credible counterfactuals of what would have happened to households in the

[1] Quoted in "Seasonal work policy benefits Pacific says Peters", *Islands Business*, October 26, 2006. http://www.islandsbusiness.com/news/index_dynamic/containerNameToReplace=MiddleMiddle/focusModuleID=130/focusContentID=6691/tableName=mediaRelease/overideSkinName=newsArticle-full.tpl (accessed August 11, 2010).

[2] These concerns are discussed in Ruhs (2006), Pritchett (2006) and OECD (2008) among others.

absence of migration. For example, Basok (2000) conducted a snowball sample of Mexican workers in Canada's seasonal worker program in one area of Canada and in one village in Mexico and asked them what they had spent their money earned on, finding that many said they had built houses and paid for schooling. Macours and Vakis (2010) look at the impact of seasonal migration on early childhood development, using a cross-sectional survey of Nicaraguan households near the border with Honduras, where half of the seasonal workers migrate to Honduras or neighboring Central American countries. They attempt to identify the impact of seasonal migration by using wage, price, and adult illness shocks experienced by the households as instruments, and find seasonal migration by mothers to reduce stunting and improve cognitive development in young children. However, these instruments seem likely to fail the exclusion restriction: as they acknowledge, the shocks could directly affect early childhood outcomes through other channels such as nutrition.

This paper seeks to provide credible evidence on the development impact of seasonal migration by means of a prospective multi-year evaluation of New Zealand's Recognised Seasonal Employer (RSE) scheme. The RSE began in 2007 and aims to ease labor shortages in New Zealand's horticulture and viticulture industries and at the same time aid economic development in the Pacific Islands. The policy was developed taking account of lessons from previous seasonal worker programs elsewhere and is viewed as a possible model for other countries. For example, the ILO good practices database states "The comprehensive approach of the RSE scheme towards filling labour shortages in the horticulture and viticulture industries in New Zealand and the system of checks to ensure that the migration process is orderly, fair, and circular could service as a model for other destination countries."[3]

Our evaluation was designed prospectively, alongside the launch of the program. Thanks to the World Bank's strong support for this policy and close collaboration with the Governments of New Zealand, Tonga, and Vanuatu, we were able to conduct baseline surveys of households and communities in Tonga and Vanuatu before workers left to work in New Zealand, and then re-interview these same households 6, 12 and 24 months later. Using this rich baseline data and institutional knowledge of how recruitment for the program occurred, we use propensity-score matching to identify an appropriate set of households to act as a comparison group for the households participating in the RSE, and then use panel difference-in-differences and fixed effects estimation to assess the impacts of the RSE on household incomes, consumption, durable assets and subjective well-being, and additionally measure broader community-level impacts.

The results show that the RSE has had large positive effects on sending households in Tonga and Vanuatu. We find per capita incomes of households participating in the RSE to have increased

[3] http://www.ilo.org/dyn/migpractice/migmain.showPractice?p_lang=en&p_practice_id=48 [accessed August 11, 2010]

by over 30 percent relative to the comparison groups in both countries, with per-capita expenditure also increasing, although by less than income. Subjective economic welfare is estimated to have increased by almost half a standard deviation in both countries, and households have purchased more durable assets such as DVD players, radios, ovens, and in Vanuatu, boats. In Tonga RSE households also doubled the rate of home improvement, and in both countries, households became more likely to have a bank account, likely reflecting more formal savings. School attendance rates increased by 20 percentage points for 16 to 18 year olds in Tonga, and community-level effects were generally modest, but positive. Overall these results show that the seasonal worker program has been a powerful development intervention for the participating households, and that the RSE policy appears to have succeeded in its development objectives in the short run.

The remainder of the paper is structured as follows. Section 2 provides a description of the RSE policy and how workers were recruited. Section 3 describes our surveys and estimation methodology. Household-level impacts are estimated in Section 4, and impacts at the community level are discussed in Section 5. Section 6 concludes.

2. The RSE policy

The RSE policy was launched on 30 April 2007. It initially allowed up to 5,000 seasonal workers to come to New Zealand for a maximum of seven months per 11 month period to work in the horticulture and viticulture industries.[4] Preference is given to workers from Pacific Island Forum countries (except Fiji), with Kiribati, Samoa, Tonga, Tuvalu, and Vanuatu selected for special "kick-start" status which entailed deliberate and expedited efforts to launch the scheme and recruit in these countries. Vanuatu and Tonga, the focus of our impact analysis, supplied the most workers under the RSE in the first two seasons: 3590 workers in the case of Vanuatu and 1971 from Tonga (including return workers).

Ramasamy et al. (2008) detail the origins of the policy and the Government thinking behind its creation. The RSE was seen as a way to solve the long-standing problems the horticulture and viticulture industries had in meeting their seasonal labor needs and boost the economic growth and productivity of this sector, while contributing to New Zealand's broad development objectives in the Pacific region. Design of the RSE paid careful attention to previous experience with seasonal worker programs around the world, and the resulting policy contains many of the features that are believed to be best practice for ensuring success of seasonal worker schemes and to mitigate the risks of overstaying, displacement of New Zealand workers, and worker exploitation.

[4] The cap was raised from 5,000 to 8,000 workers in October 2008. Workers from Kiribati and Tuvalu are permitted to stay for up to 9 months instead of 7, each 11 month period.

The risk of overstaying is mitigated in a number of ways: workers may be re-employed in subsequent years, either with the same or a new employer, which can be contrasted with single-entry schemes which provide high incentives for workers to overstay; employers are required to pay the costs associated with worker removal from New Zealand if workers become illegal, giving employers incentives to choose workers who they believe will return, and to not be complicit in their overstaying; and competition for places among communities and countries leads to social pressures to not jeopardize future possibilities for others by overstaying and thereby creating a negative reputation for one's community.

The risk of displacement of New Zealand workers is mitigated through a "New Zealanders first" principle of the policy, which requires employers to first lodge their vacancies with the Ministry of Social Development (who provide welfare benefits and job search services) before attempting to recruit offshore. The RSE places special emphasis on "pastoral care", with employers required to arrange suitable accommodation, internal transportation, access to personal banking services, provision of protective equipment and opportunities for recreation and religious observance. The risk of exploitation is mitigated through regulations stating that workers must not be charged recruitment fees and that employers must pay market wages and offer workers at least a minimum remuneration which depends on the length of the contract.

Inter-agency understandings between the New Zealand Department of Labour and the respective labor ministry in each kick-start country set out the recruitment options in each country. In Tonga employers wishing to hire workers could either recruit the workers directly, or recruit from a "work-ready" pool of Tongan nationals pre-screened and selected by the ministry. In the first year recruitment from the work-ready pool was the dominant employment mode. The work-ready pool was established by pre-selection and screening at the district level by district and town officers, together with church and community leaders. The tremendous interest in the scheme was seen in more than 5,000 Tongans having registered for the work-ready pool within 3 months of the launch of the scheme. In Gibson et al. (2008) we explore in detail this selection process, and find that the main attributes used by village committees in pre-selection were looking for honest, responsible, hard-working people who spoke reasonable English, didn't drink alcohol excessively, and who were from low-income families. Employers recruiting from this pool would then conduct interviews of the short-listed workers to decide who to take. The Tongan Labour Ministry was very conscious to try and ensure that as many villages as possible were given the opportunity to participate, and all villages had workers in the scheme.

In Vanuatu employers could either hire directly or through an agent. Direct recruitment is facilitated by the Vanuatu Department of Labour, which in the first year also used a work-ready pool of workers from walk-ins who registered directly with the department. These workers were typically from the more urban areas. In rural areas, direct recruitment and agents relied heavily on community contacts through village councils, again using villages to pre-screen workers. In McKenzie et al. (2008) we study this process, and find that, similar to Tonga, agents and villages

looked for people who were strong, hardworking, obedient, healthy, spoke English and were not alcoholics. Perhaps due to the newness of international migration in Vanuatu, it was not the poorest households who applied and had workers selected for the program, with communities more concerned with sending workers who would represent the village well, and the poorest households not necessarily having information about the program in the first year, or having the resources to finance the costs of the travel process.[5]

Typical work under the RSE includes working on vineyards to prune vines and pick grapes, harvesting apples and kiwifruit and other fruitpicking, and working in the packhouse to sort, grade, and pack the fruit. The work was typically physically demanding, and included work in both cold and hot conditions. In part due to the nature of the work, the majority of RSE workers recruited were male: in the first year in our sample, 82 percent of the ni-Vanuatu RSE workers and 87 percent of the Tongan RSE workers were male. This corresponds closely to the gender-mix in the population of RSE workers from these countries in the first year – official data on all workers from Tonga and Vanuatu recruited by 22 May 2008 show that males comprised 78 percent of the ni-Vanuatu and 91 percent of the Tongans recruited by that date (effectively the first season).[6]

The RSE has been viewed as a success from the New Zealand point of view. An evaluation of the first two years conducted by the New Zealand Department of Labour (2010, p.xvii) concluded that "Overall, the RSE Policy has achieved what it set out to do" The policy is found to have provided employers in the horticulture and viticulture industries with access to a reliable and stable workforce, with productivity gains starting to emerge as workers return for another season. The main concerns raised about temporary labor programs have been mitigated: the evaluation finds little displacement of New Zealand workers; almost all workers have returned, with overstay rates of about 1 percent in the first season and less than 1 percent in the second; and concerns about worker exploitation have at most arisen in a couple of isolated cases. The question this paper addresses is then whether the RSE has also lived up to the policy goal of improving development in the Pacific.

3. Our surveys and estimation methodology

3.1 The surveys

There was keen interest from national Governments on both sides of the migration relationship and from the World Bank in learning whether the new RSE policy would have the development impacts envisioned as one of the core rationales for the program. It was therefore decided ex ante

[5] Employers are required to cover half the cost of the return airfare, and often provide loans to workers for the worker share. But workers still had to meet the costs of a passport, visa, police clearance, medical check-up, and local transport to and from their home to the airport.

[6] Official data provided as a custom table by the New Zealand Department of Labour.

that there should be a rigorous evaluation of the development impacts of the program. We decided on Tonga and Vanuatu as the focus of our evaluation, since it was expected that they would be the countries that participated most, and they offer an interesting contrast in previous migration history with New Zealand.[7] Tonga (population 100,000) has traditionally had high emigration rates to New Zealand, Australia and the United States, with most recent migration through family-sponsored categories and a special annual permanent migration quota to New Zealand called the Pacific Access Category. The 2006 New Zealand Census enumerated 20,520 Tongan-born in New Zealand.[8] In contrast to Tonga, Vanuatu (population 215,000) has had relatively little international emigration, with only 1.5 percent of its population abroad prior to the RSE (World Bank, 2008), and fewer than 1,000 Vanuatu-born in the 2006 New Zealand Census.

Given that recruiting of workers occurred at the employer level, the interests of employers in screening workers themselves, and the large number of employers involved, it was never going to be feasible to attempt to get employers to randomly select workers. Therefore we decided the most credible impact evaluation strategy would be a matched difference-in-differences approach. This would entail conducting a baseline survey of households which would participate in the RSE before the workers left, along with surveys of non-participating households, and then following these households over time. Non-participating households would be separated into whether or not they had a member of the work-ready pool who had applied for the program, but not been selected.

The RSE contains no country-specific quotas, so ex ante it was not known how many individuals from each country would participate in the scheme. However, the numbers likely to be involved were certainly too small for a simple random sample of households to pick up enough RSE households in a cost-effective way – at most 5% of households would be likely to participate in the program. This meant we needed to know RSE status before surveying. Survey design was then complicated by the fact that approvals to recruit workers and recruitment took place on a rolling basis. For example, the first employer to recruit workers under the RSE initially contracted 20 Tongans workers in July 2007, the next employer in Tonga contracted 6 workers in August, and the next 35 in September. In Vanuatu, a grower co-operative (Seasonal Solutions) contracted 232 workers in one go, with smaller employers also recruiting at staggered intervals. Once workers were selected for recruitment, there was often only two or three weeks before they left for New Zealand, which left a very short window of time to interview them and their household for baseline, or to at least interview their household within a week or two of their

[7] Tuvalu and Kiribati both had fewer than 100 workers per season participate in the RSE, offering insufficient sample size for rigorous impact assessment. Samoa was the other main kick-start country. A one-off ex-post survey of households was conducted there.

[8] http://www.stats.govt.nz/Census/2006CensusHomePage/QuickStats/quickstats-about-a-subject/culture-and-identity.aspx (accessed August 13, 2010).

departure (with the worker intercepted upon arrival in New Zealand and interviewed separately from their household).

Given these conditions, we used a rolling sampling methodology, adding sample as we received updates of when, where, and who employers were recruiting. In both countries the baseline survey was conducted between October 2007 and April 2008. In Tonga our survey has near national coverage, covering the islands of Tongatapu, Vava'u and 'Eua. These three islands contain 90 percent of the population and 92 percent of the RSE workers in the first year. We worked closely with the Tongan Labour Ministry to identify villages supplying workers, and within those the village town officers identified households with RSE workers and households with members of the RSE work-ready pool who had not been selected yet. We additionally surveyed randomly selected households in the same villages where no one had applied for the program. In each village we aimed for approximately five households with an RSE worker, three households with a member of the work-ready pool who was not selected, and four households with non-applicants. Our resulting baseline survey covered 448 households containing 2,335 individuals in 46 villages.[9]

Vanuatu's rugged geography and high transportation costs meant it was not feasible to survey in all islands, so a decision was made to limit the evaluation to three islands from which we believed there was a high ex ante chance of workers coming. These islands were Efate (population 50,000), where the capital city, Port Vila, is located; and Ambrym (population 10,000) and Tanna (population 20,000). These latter two islands were chosen due to Seasonal Solutions hiring from these islands. In contrast to Tonga, not all villages in Vanuatu were initially participating in the RSE, and in addition to sampling non-applicant households from within villages with participating RSE workers, we also sampled households from nearby villages or communities which had not participated in the RSE. Ultimately our baseline survey covered 456 households containing 2,173 individuals in 48 villages or communities.

Three rounds of follow-up surveys were then conducted. The first took place between April and July 2008, approximately six months after the baseline survey. This was intended to be a time when RSE workers were still in the midst of their 7 month stint abroad. However, as in practice many contracts were for shorter than 7 months (to be discussed below), approximately two-thirds of Tongan RSE workers and one-fifth of ni-Vanuatu RSE workers in our sample had returned by the time of this survey. The second follow-up survey took place between October 2008 and February 2009, approximately one year after the baseline, while the third and final follow-up survey took place between October 2009 and March 2010, two years after baseline.

[9] Further details of the baseline sampling methodology for Tonga are contained in Gibson et al. (2008), while McKenzie et al. (2008) provides more details on the Vanuatu sampling methodology.

Attrition was remarkably low in the Tongan sample. Of the 448 households in the baseline, we were able to re-interview 442 households in the second round survey, 444 in the third round, and 440 in the fourth round. In contrast, attrition was higher in Vanuatu. Of the 456 households in the baseline survey, 382, 388, and 348 households were re-interviewed in rounds 2, 3 and 4 respectively, whilst 33 households were only interviewed in round 1. The higher attrition rates arose from i) internal mobility, with a few households moving to other islands within Vanuatu that were not part of the three where we were surveying; ii) cases where the RSE worker died and the rest of the household moved; iii) respondent fatigue, with some of the non-RSE households complaining that their lives had not changed at all, so why were we asking the same questions over again; and iv) 8 cases where husbands or wives divorced while the other was away in New Zealand, and the worker refused to answer. In an appendix we show our main results are robust to this attrition.

3.2 Estimation methodology

We consider two measures of a household's participation in the RSE. The first is a binary indicator $RSE_{i,t}$ of whether household *i* has at least one member who has worked in the RSE by time *t*, where *t=1,2,3* and *4* corresponds to our four survey waves. This variable takes value zero in the baseline for all households, and then switches on once a household participates in the RSE. Estimating the impact of $RSE_{i,t}$ then involves estimating the average impact of ever participating in the RSE over the first two years of the program.

However households varied substantially in the degree of their exposure to the RSE. This variation in the intensity of RSE participation arose from i) differences in the duration of a contract, with contract durations varying between three and seven months, and a small number of workers returning after only one or two months before their contract had ended; ii) differences in whether workers returned for a second or even third contract during our survey period; and iii) a handful of households having more than one worker participate in the RSE.[10] We therefore define a second measure of household RSE participation, $RSEDuration_{i,t}$, as the cumulative number of months workers from household *i* have spent in New Zealand by time period *t*. Among the RSE households in our Tongan sample, the mean (median) cumulative duration in New Zealand by the time of our fourth round survey was 7.8 months (6 months), with a 10^{th} percentile of 3 months and 90^{th} percentile of 14 months. For RSE households in Vanuatu, the mean (median) at the time of the fourth round survey was 8.4 months (7 months), with a 10^{th} percentile of 4 months and 90^{th} percentile of 14 months. 58 percent of Tongan RSE households

[10] For the RSE as a whole, 23 percent of workers spent 3 months or less in New Zealand, 18 percent spent 4 months, 20 percent spent 5 months, 27 percent spent 6 months and 11 percent spent 7 months (as of August 23, 2009, see Table 5 of New Zealand Department of Labour, 2010). 51 percent of workers from kick-start states from the first season returned in the second season.

and 54 percent of Vanuatu RSE households had only one seasonal worker spell during the two years of our study.

We then begin with panel data regressions of the impact of the RSE in each country, using the full sample of households from each country. Letting $Y_{i,t}$ be an outcome of interest for household *i* in survey round *t*, we begin with the following difference-in-differences specification:

$$Y_{i,t} = \alpha + \beta EverRSE_i + \sum_{t=2}^{4} \delta_t + \gamma RSE_{i,t} + \varepsilon_{i,t} \quad (1)$$

Where $EverRSE_i$ indicates whether household *i* ever participates in the RSE over the four waves of our sample, and δ_t are survey round dummies. The coefficient of interest is then γ, which gives the average treatment effect of participating in the RSE. We do not include additional time-varying controls in this regression, since we have few time-varying variables that are not potentially themselves affected by the RSE. Standard errors are clustered at the household level to account for autocorrelation in the error term $\varepsilon_{i,t}$ across survey waves. The same equation is also estimated using $RSEDuration_{i,t}$ in place of $RSE_{i,t,}$, in which case γ gives the average household-level impact of one month's duration in the RSE.

Difference-in-differences controls for any baseline level differences in the outcome $Y_{i,t}$ at the group-level. An alternative approach is to control for baseline differences at the household-level through the addition of household-level fixed effects. We estimate this via the following specification:

$$Y_{i,t} = \mu_i + \sum_{t=2}^{4} \delta_t + \gamma RSE_{i,t} + \varepsilon_{i,t} \quad (2)$$

Where μ_i is the fixed effect for household *i*. Again we estimate this using both our measures of household-level RSE participation, and cluster the standard errors at the household level.

The underlying assumption in both the difference-in-differences and the fixed effects specifications is that after controlling for level differences among households, they would have exhibited the same trends in the outcome variables in the absence of the RSE. However, this assumption is less credible when the households we are comparing have very different characteristics. We therefore follow the recommendations of Crump et al. (2009), who recommend estimating a propensity score, and then dropping observations with estimated propensity scores outside the range [0.1,0.9]. This ensures the regression is estimated only for the sample where the covariate distribution overlaps for the RSE and non-RSE households.

Our study includes many of the features identified as desirable for propensity-score matching (Dehejia, 2005). Our surveys of RSE and non-RSE households were conducted at the same time in the same villages (and hence local labor markets) using the same questionnaire. We have good knowledge of the characteristics villages and employers were looking for in selecting workers and can include these in the matching specification. In addition we have more than one period of

pre-RSE wage earning data (although only a minority of households earned wage income). Furthermore we know whether households tried to participate in the RSE (by having a member register for the work-ready pool, or apply directly to an employer). Finally, we also have a plausible reason why some households participated in the RSE and other households with these same characteristics did not – there was excess demand for RSE employment, and so not all households who wanted to participate were able to.

We estimate two versions of the propensity score, which we denote PS-1 and PS-2. They differ only in that PS-2 first restricts the sample to households which applied to participate in the RSE before estimating the score, eliminating the non-applicant households. This allows us to explicitly screen on demand for the RSE, although given that the reason many non-applicant households said they didn't apply was lack of information about the program (Gibson et al, 2008; McKenzie et al, 2008), failure to apply need not imply lack of demand.

We then use six main categories of variables which we believe may influence participation in the RSE to estimate the propensity score: demographic variables (household size, number of males aged 18 to 50, number of adults, number of school age children); characteristics of the 18-50 year old males in the household, who are the individuals most likely to participate (share literate in English, share with schooling beyond grade 10, the share with self-reported health rated as very good, the share who drank alcohol in the past month, and the mean number of days of hard labor carried out in the past month); the household's previous experience and network in New Zealand (share of adults who had previously been to New Zealand, number of relatives in New Zealand); household baseline assets and housing infrastructure (an asset index comprising the first principal component of durable goods owned, the number of pigs, cattle and chickens owned, and whether the dwelling was traditional style); geography (on Tongatapu or Efate as opposed to one of the other islands) and past household wage and salary history (household wage income for the first half of 2006 and 2007, and whether the household had any male aged 18 to 50 in each of these periods). For each variable we include both the variable and its square in estimating the propensity score.

For Tonga estimating the propensity score and restricting to the range [0.1, 0.9] reduces our sample of 448 households (197 RSE, 251 non-RSE) to 372 households using PS-1 (182 RSE and 190 non-RSE) and 284 households using PS-2 (154 RSE, 121 non-RSE). In Vanuatu the sample of 456 households (147 RSE, 309 non-RSE) reduces to 360 households using PS-1 (129 RSE, 231 non-RSE) and to 269 households using PS-2 (123 RSE, 146 non-RSE). The trimmed samples thus mainly trim out non-RSE households which are too dissimilar to RSE households to be appropriate comparators, whilst also trimming out a few of the RSE households which differ too much from any non-RSE household.

We then re-estimate (1) and (2) for households with propensity scores in the range [0.1, 0.9]. Again the differencing or fixed effects will eliminate both observed and unobserved time-

invariant differences amongst households, and the assumption of a common underlying trend in the absence of the RSE is likely to be more credible for households with propensity scores within this range.

We use equations (1) and (2) to look at the impact of the RSE on flow variables of interest, like income, consumption, and their components. To look at the impacts on stock variables like assets owned, we instead estimate, for households within the propensity score range [0.1, 0.9], the following equation:

$$Y_{i,4} = \alpha + \beta Y_{i,1} + \gamma RSE_{i,4} + \varepsilon_{i,4} \quad (3)$$

For example, estimating equation (3) for whether the household owns a TV, is equivalent to asking whether, conditional on their TV ownership status in the baseline, households which participated in the RSE are more likely to own a TV two years later than non-RSE households with similar covariates.

Finally, for the variables subjective well-being, making a dwelling improvement over the two years of our study, and making a major asset purchase (200 pa'anga or more in Tonga, 10,000 vatu or more in Vanuatu) over the two years of our study we estimate equation (3) without including the baseline lag.

3.3 Measurement and Summary Statistics

The main outcomes of interest are household income and expenditure, asset ownership, and schooling. Household income is measured as the sum of net remittances (remittance inflows less remittance outflows, including RSE remittances as an inflow), cash sales of agricultural production, the value of food produced for own consumption, wage and salary income, other income such as interest or rent income, and repatriated earnings that RSE migrants carry back with them instead of remitting while abroad. Household expenditure is measured via a 20 category recall module, with reference periods ranging between one week and six months depending on the source of expenditure. This is aggregated to the semi-annual level and added to the value of food produced for own use to arrive at total expenditure.

Table 1 presents baseline means of household characteristics for the RSE households, for all other households in the sample, and for the PS-1 and PS-2 screened subsamples. Asterisks show the results of tests for difference in means. Consider first the Tongan sample. The average RSE household has 5.7 members, including 1.5 males aged 18 to 50. The largely rural subsistence farming nature of these households is seen in only 21 percent of these households having any male wage or salary worker in the household six months prior to the launch of the RSE, as well as in the average household owning pigs and chickens. Semi-annual per capita income and consumption, including the value of goods produced for own consumption, averaged 830

pa'anga (approximately US$432).[11] This is less than a RSE worker could earn in a good week in New Zealand.

Table 1 shows that the Tongan RSE households tend to be larger and poorer than the average non-RSE household in our sample. The males in these households worked more days of hard labor on average than non-RSE households, reflecting selection of workers more able or inclined to do physical work. The RSE households are also more connected to New Zealand, with adults in the household more likely to have previously been to New Zealand, and the household having more relatives in New Zealand. The third and fourth columns of the Table show that matching and restricting to households with propensity-score between 0.1 and 0.9 makes the RSE and non-RSE households more similar as we drop non-RSE households which differ substantially from the RSE households on these variables. The PS-2 subsample in particular does not differ significantly in baseline demographics, income, or consumption from the subsample of RSE households with propensity scores in the [0.1, 0.9] range.

In contrast to Tonga, the RSE households in Vanuatu tend to be richer than the average non-RSE household, with higher baseline asset ownership, income and consumption. Nevertheless, a large share of those participating are still poor by international standards: 37 percent of the RSE households have per capita income of below US$2 per day. Again matching and restricting to households with propensity-scores between 0.1 and 0.9 makes the RSE and non-RSE households more similar. However, in contrast to Tonga, the restriction to applicant households in PS-2 does not seem to improve on PS-1. This likely reflects the less widespread nature of the work-ready pool in Vanuatu, meaning that some non-applicants may be better matches for RSE workers in Vanuatu than we can find amongst our sample of applicants.

Comparing the characteristics of the Tongan and ni-Vanuatu samples shows the much greater prior exposure of Tongans to international migration: the average Tongan RSE worker in our sample has 5.4 relatives in New Zealand, compared to 0.1 relatives for the average ni-Vanuatu RSE worker in our sample. 38 percent of Tongan RSE households have an adult in the household who has worked or studied for one month or more in New Zealand before, compared to only 8 percent of the ni-Vanuatu RSE households. The higher levels of schooling in Tonga are seen in a greater share of adult males in Tonga being literate in English, and in 46 percent of males aged 18 to 50 in RSE households having more than 10 years of schooling in Tonga, compared to only 6 percent in Vanuatu. However, the Vanuatu sample is more likely to have previously worked for pay, and in the end, the poverty rates are similar for our evaluation samples in both countries.

[11] In April 2008, NZ$1 = 1.52 pa'anga and US$1 = 1.92 pa'anga; NZ$1 = 73.08 vatu, and US$1 = 92.50 vatu.

4. Household-level Impacts

4.1 Impact on Income and Expenditure

Table 2 presents the results of estimating equation (1) in columns 1-4 and equation (2) in columns 5-8 for Tonga.[12] For each estimation method we begin with the full sample, and then show the results for the propensity-score screened samples. Finally to check whether our results are being driven by a few observations at the upper tail, columns 4 and 8 trim the top 1 percent of observations from the sample. Panel A shows the impact of a household ever being in the RSE, and Panel B the impact per month of duration in the RSE.

Participating in the RSE is found to have a large and statistically significant positive impact on household income per capita in Tonga. Semi-annual income is estimated to be 233-249 pa'anga more as a result of the RSE, relative to a baseline income of 979 pa'anga for these households. Trimming for potential outliers increases this gain even more, to 300-325 pa'anga. Log income is less sensitive to outliers, and we also see large and statistically significant impacts on log income. Using the estimates which screen on PS-2 and are thus restricted to RSE applicants, the estimated increase in log income is 0.29-0.32, corresponding to a 34 to 38 percent increase in per capita income as a result of the RSE. The duration results also give positive, and statistically significant, impacts of the RSE. Each month of participation in the RSE is estimated to increase household per capita income by 20-31 pa'anga.

Household expenditure per capita is also found to increase with participation in the RSE in Tonga. However, the increase is less than the increase in per capita income, and if we restrict ourselves to the PS-2 screened sample, is only significant after trimming outliers. The log per capita consumption results suggest the increase in expenditure is approximately 9-10 percent, which is only a third of the increase in per capita income. This is consistent with some of the additional income being saved, or being spent on items that are not asked or not recalled well in our expenditure recall module.

Table 3 considers the same impacts for Vanuatu. The difference-in-differences results show large and statistically significant impacts of participating in the RSE on per capita income and expenditure. Semi-annual income is estimated to be approximately 44,000 vatu higher, relative to a baseline of 85,000 vatu. In log terms, per capita income is 0.30 to 0.36 log points higher, which is equivalent to a 35 to 43 percentage increase. Semi-annual per capita expenditure is

[12] Note that we are assessing the impacts on income and expenditure of household members in Tonga and Vanuatu. The seasonal worker is counted as part of the household for periods when he or she is in the home country, but they are not included when they are in New Zealand. To the extent that migrants are earning and consuming more than the average remaining household member whilst they are abroad, we are therefore underestimating the average impact on individuals originally present in the household, even though we get the average impact for individuals present in the household in the sending countries.

approximately 12,000-13,000 vatu higher, relative to a baseline of 65,000 vatu, and the effect on log expenditure is equivalent to approximately a 28 percent increase. Panel B of the table also shows positive and significant effects using the duration of time in the RSE as the dependent variable.

The fixed effects results also give large point estimates, although smaller in magnitude than the difference-in-difference estimates, and less significant. Nonetheless, the results on the PS-1 and PS-2 screened samples still show significant increases in both logs and levels of per capita income and consumption when using the duration in the RSE, and significant impacts on per-capita income and log per capita consumption using the measure of ever in the RSE. One potential reason for the smaller coefficients with fixed effects is attenuation bias due to measurement error. The Vanuatu data is considerably noisier than the Tongan data. For example, the baseline coefficient of variation of per capita income for the RSE households is 0.90 in Tonga compared to 1.40 in Vanuatu, while the correlation in per capita income from one wave to the next for the non-RSE households varies from 0.43 to 0.77 in Tonga, compared to between 0.19 and 0.27 in Vanuatu. There is thus more signal relative to noise in the Tongan data than in the Vanuatu data.

A final point to note on Tables 2 and 3 is that the estimates are reasonably robust to the choice of sample, with the estimated effects not changing dramatically as one moves from the full sample to the PS-1 and PS-2 screened samples. Given this robustness to different control samples and to controlling for individual fixed effects, and given the large magnitudes of the effects estimated, we believe these estimates of the causal effect of the RSE are convincing and unlikely to be driven by unobserved self-selection.

The median after-tax income earned in New Zealand reported by the seasonal migrants is approximately NZ$12,000.[13] This is several multiples of the mean annual household income per capita of RSE households at baseline, which was approximately NZ$1400 in Tonga and NZ$2500 in Vanuatu. Despite the large increase in income from the RSE, one might then ask why the increase in per capita incomes is "only" 35 percent. First, workers face costs in New Zealand, both from living expenses (including rent and health insurance) and from repayment of their share of the airfare. Out of the NZ$12,000 in income, the average worker remitted or brought back with them an average of NZ$5,500. This amount was similar in Tonga and Vanuatu, the difference being that in Tonga about half was in the form of remittances and half as repatriated savings, whereas in Vanuatu only 10 percent was in the form of remittances and 90 percent as repatriated savings. Second, when we consider per capita income, this amount is divided by 5.7 in Tonga and 4.7 in Vanuatu. Third, we are looking at average impacts over 2 years, so since just over half the households sent a worker in one year only, the per capita per year effect for these households has to be divided by two. Finally, households also lose both the

[13] This number accords well with what migrants should have been earning given prevailing wage rates in the sector.

wage income and contribution to agricultural production the household member would have contributed while in New Zealand. Nevertheless, this gain in income is still massive compared to other popular development interventions – it compares to a 8 percent gain in per capita consumption from Progresa/Oportunidades (Fiszbein and Schady, 2009) and to no average increase in per capita consumption from a microfinance intervention (Banerjee et al, 2010).

4.2 Impact on Subjective Well-being

In addition to measuring household welfare through income and expenditure, our final round survey measured subjective well-being. Households were asked to imagine a 10-step ladder, where on the bottom step were the poorest people and the top step the richest people, and to state which step of the ladder they thought their household was on today, and on which step their household was on two years ago. Ravallion and Lokshin (2001) refer to this as an economic ladder question, and note that it leaves it up to the individual to define what constitutes "poor" or not, and captures subjective economic welfare.

We estimate equation (3) without including baseline subjective wellbeing as a control since it is only measured ex post. The results are shown in the first row of Table 4.[14] In Tonga, participating in the RSE is estimated to increase subjective welfare by 0.43 steps on the ladder, about 45 percent of a standard deviation. This effect is strongly significant. Adding the household's recalled subjective well-being from two years earlier only slightly reduces this coefficient, to 0.36 for the PS-2 screened group, and is still strongly significant ($p<0.001$). Participating in the RSE is estimated to increase subjective welfare by 0.71-0.83 steps on the ladder in Vanuatu, which is 43-50 percent of a standard deviation and strongly significant. Adding the household's recalled subjective well-being from two years earlier does not change these results, yielding coefficients in the 0.74-0.85 range, with again strong significance ($p<0.001$). Subjective economic welfare has therefore increased in both countries for households participating in the RSE. Moreover, the increase in subjective welfare is of similar magnitude in terms of standard deviation improvements as the increases in income: the estimated impacts on per capita income in tables 2 and 3 translate to a 0.24-0.43 standard deviation increase in per capita income in Tonga, and 0.31-0.47 standard deviation increase in per capita income in Vanuatu.

4.3 Impact on Dwelling Improvements and Durable Assets

Home improvement was the third most commonly mentioned use of the money Tongan RSE households earned through the RSE (after meeting family needs and paying for school fees). The second row of Table 4 shows that Tongan households participating in the RSE were 10 to 11 percentage points more likely to have made a dwelling improvement over the two years of our

[14] Table 4 just shows the PS-1 and PS-2 screened results for reasons of space. The results using the full sample are similar both in terms of magnitudes and statistical significance.

surveys. This represents an almost doubling of the percentage of non-RSE households which made dwelling improvements over the same period (12 percent). Home improvements were the most commonly mentioned main use of money from the RSE in Vanuatu, with participants saying that they were using money earned to do things such as build a new house, install a solar panel, add an iron roof, or renovate their house. However, although the point estimates suggest that RSE households were 7-8 percentage points more likely to make a dwelling improvement, this effect is only marginally significant when using the binary categorization of RSE status. We do see a significant positive effect using duration in RSE. Dwelling improvements are reported to be much more commonplace in Vanuatu than in our Tongan survey, with 79 percent of non-RSE households making a dwelling improvement over the two years of our surveys.[15] The impact of the RSE may also then be for households to make more substantive improvements, such as the transition from traditional to modern dwellings, which our surveys don't directly capture since dwelling type was only recorded at baseline.

In the baseline survey, 65 percent of Tongan RSE households reported having a bank account. By the fourth round this had increased to 83 percent. Row 4 of Table 4 shows this represents a statistically significant 10-14 percentage point increase relative to non-RSE households over the two year period. This increase in bank account usage likely reflects bank accounts being set up for the purpose of household savings, rather than bank accounts directly being used to receive remittances. For the Tongan sample, over 90 percent of remittances were made via Melei mei Langi (a Tongan-run money transfer operator) or Western Union, and only 1 household in our sample directly transferred money through a bank. In Vanuatu we find the share of RSE households with a bank account increasing from 55 percent in the baseline to 74 percent for the same households two years later. This is estimated to be a statistically significant 17-18 percentage point increase relative to the non-RSE households over the same period. Although 22 percent of ni-Vanuatu RSE households receiving remittances received them through a bank transfer (Western Union was the main source of transfers), this effect of the RSE on bank account usage continues to hold even if we control for whether the household received a bank transfer remittance. Therefore, as in Tonga, it is likely that this increase in household bank account usage reflects the use of banks for savings, rather than just to receive remittances.

The remainder of Table 4 considers durable asset ownership. Each follow-up round asked households if they had made any major purchase of assets since the last survey, defined as valued at 200 pa'anga or more in Tonga or 10,000 vatu or more in Vanuatu. Row 3 of Table 4 shows that Tongan RSE households were 12-15 percentage points more likely to have made such a purchase, which is again double the rate of non-RSE households. Ni-Vanuatu RSE households were 27-30 percent more likely to have made such a purchase, which more than doubles the 20

[15] This reflects the much higher proportion of households living in traditional (bush material) dwellings in Vanuatu, which have short life expectancy compared with modern dwellings.

percent of non-RSE households making such a purchase. In both countries the impact is statistically significant.

In addition to households purchasing assets, RSE workers sometimes returned with durable goods acquired abroad. DVD players were the most common such asset. Each round of the survey also directly asked about ownership of certain durable goods, enabling us to capture the net effect of purchases, sales, and durable goods that migrants bought back with them. The Tongan RSE households are significantly more likely to have acquired a cellphone, television, DVD player, and bicycle over the two-year period than similar non-RSE households. RSE households also seem to have sold their kerosene ovens and purchased gas or electric ovens instead. The ni-Vanuatu RSE households are significantly more likely to have acquired a radio or stereo, a DVD player, a computer, a gas or electric oven and a boat over the two-year period than similar non-RSE households. We do not see any significant impact on livestock ownership in either country.

4.4 Impact on Children's Education and Business Ownership

In addition to raising household incomes and assets, an important motivation for many households to participate in the RSE was the chance to raise money to pay for school fees. In our baseline survey 85 percent of Tongan RSE households and 98 percent of ni-Vanuatu RSE households said that earning money to pay for school fees was a very important or somewhat important motive for participating in the RSE. In addition, school fees are one of the most common special purposes that households report using remittance income from RSE workers for in our surveys, and when households were asked in the final round survey what the most important use of the money earned in the RSE has been, 40% of Tongans and 28% of ni-Vanuatu said school expenses. The question is then whether this translates into higher schooling attainment for children.

Table 5 shows the impact of being in an RSE household on school attendance in the final round survey, conditional on baseline school attendance status and age (equation 3). In Tonga, schooling is compulsory between ages 6 and 15, and there is near universal school enrolment for children of these ages. It is therefore no surprise that we see no impact of the RSE on children who were aged 6 to 14 at baseline since over 97 percent of children of this age are attending school whether or not their household is in the RSE. In contrast, the last three columns of panel A show large positive effects of the RSE on school attendance of children aged 15 to 18 years at baseline. These effects are statistically significant for the full sample and PS-1 samples, and of similar magnitude but not significant in the smaller PS-2 sample. The magnitude of the effect is sizeable – a 10 to 14 percentage point increase in the proportion attending school, relative to 60 percent of children in non-RSE households attending school on average over this two year period.

In contrast, panel B shows no significant effect of the RSE on school attendance in Vanuatu. One reason may be that starting in 2010, when the final round survey was in the field, primary schooling became fully subsidized whereas previous fees were 7000 vatu per year (10 percent of per capita average income). Moreover, many schools had allowed students to remain enrolled even with unpaid fees from previous years; the main incentive to clearing these debts was that it allowed students to sit the leaving examinations at the end of Grade 6 and 8. Hence, RSE workers reporting the payment of school fees as a motivation may have repaying school fee debts, which would not show up in current enrolment except for a possibly higher transition rate to high school (which also depends on examination performance). Our data do not capture this higher transition rate, partly because rural students often leave their households to live with urban relatives so as to attend secondary school (national secondary enrolment rates are below 40 percent and are much lower in rural areas, in part because of geographic inaccessibly of schools).

The apparently divergent impacts of RSE participation on school enrolment also may reflect the nature of the selection into the RSE in the two countries. In Vanuatu, the households participating in the RSE are relatively better off, and their children have higher baseline school attendance rates than non-RSE households. It is therefore possible that credit constraints were not limiting schooling for this group. In contrast, the Tongan RSE households were relatively poorer at baseline than the non-RSE households, and had lower school attendance rates. The extra income earned through the RSE allows them to then catch-up to (and surpass) the school attendance rates of the non-RSE group.

Our data do not show any evidence that the RSE has fostered the development of non-agricultural businesses among the households in our sample in Tonga. None of the households surveyed mentioned investment in a business as a main use of the money earned in the RSE, and we do not observe any individuals in RSE households starting a new business over the two year period of our surveys. In Vanuatu we only had 5 households in the round 4 survey say the most important use of the money earned through the RSE was starting a business or supporting an existing business. Given the low population densities and small local markets, it is not clear what the scope for such business start-ups actually is, but over the first two years of the RSE policy, there does not appear to be much evidence of it fostering self-employment.

5. Community-level Impacts

Finally we consider the broader impacts of the RSE on the sending communities. The most direct impact is through the monetary contribution that migrants make to their communities, either through remitting to a community group while abroad or contributing some of their repatriated earnings to this group upon return. We asked return migrants how much they had contributed in this way to the community. The mean response aggregated over the two years was 157 pa'anga in Tonga and 11733 vatu in Vanuatu – or approximately US$80-130 per migrant. Our expenditure module also collected expenditure on community obligations, but only for a recall

period of one month, thereby likely missing one-off contributions made by migrants upon return. The difference-in-differences regression then gives a positive, but insignificant impact on this item.

To further gauge the impacts at the community level, we conducted surveys of community leaders. This was done at baseline and at the time of the second round survey in Vanuatu, and at baseline and at the times of the third and fourth round surveys in Tonga. These data are thus less useful for Vanuatu, since they only measure immediate effects while most workers were still away. The Tongan surveys reveal the mean (median) community saying it received 633 (500) pa'anga from RSE workers, which is consistent with the community surveys giving a median of 5 workers per village participating coupled with the amounts reported by workers. The main use of this fund in 83% of cases in Tonga was funding the village water supply in the first year. In the second year, villages were also using this for street lighting, a school scholarship fund, community halls, and in one case, adding internet to a community hall.

Village leaders were directly asked the main benefit and main disadvantages of the RSE for their community. In Vanuatu this was only asked in wave 2, 6 months into the RSE. The main benefits reported at this stage were job opportunities for people in the village, money to support the village church, and improvements in housing. Disadvantages were less people to do the community work, cases where a worker is not contributing to church or family, and concerns about the potential bad influence of alcohol abroad. In Tonga these questions were asked in waves 3 and 4, approximately one year and two years into the RSE. The main benefit reported at one year is income for families, along with some saying income for the community and church donations. After two years, there are also a few mentions of improved skills and improved English in the workers, and positive impacts on school enrolments. When asked the main disadvantage, at one year, more than half say none, the main other answer being family separation. At two years, one-third say family separation, 30 percent say less labor for village, church, and community projects, about 15 percent say fewer members for church activities.

Table 6 then summarizes the results of questions in both the household and community leader surveys intended to measure qualitatively the impressions of the broader community-level impacts of the RSE. The RSE workers themselves believe that participation in the RSE either improved or left unchanged their family and community life. Non-RSE households in Tonga also see benefits in terms of community life, availability of paid jobs, and schooling opportunities. To the extent that such benefits are really accruing to non-RSE households, our estimates comparing RSE to non-RSE households will be a lower bound on the positive development impact of the RSE program. Non-RSE households in Vanuatu are more likely than those in Tonga to say there has been no change in community life or in job or schooling opportunities. Finally, the bottom of the table summarizes the results of asking community leaders their assessment of the overall impact of the RSE on their communities. In Tonga 92 percent of leaders say that it has had

positive effects after two years, and in Vanuatu, even at 6 months, 72 percent of leaders say the overall impact is positive.

6. Conclusions

New Zealand's Recognised Seasonal Employer program was designed with promoting development in the Pacific Islands as an explicit goal. The results of our multi-year prospective impact evaluation show that it has largely achieved this goal. Participating in the RSE has raised incomes in both Tonga and Vanuatu, allowed households to accumulate more assets, increased subjective standards of living, and, additionally in Tonga improved child school attendance for older children. Communities also seem to have received modest benefits in terms of monetary contributions from workers, with community leaders overwhelmingly viewing the policy as having an overall positive impact.

These results make this seasonal migration program one of the most effective development interventions for which rigorous evaluations are available. In addition, although there has been non-trivial investment by both the New Zealand and Pacific Governments in setting up and facilitating this policy, it does not involve grants, and appears to be benefiting both the private employers and the workers. The design features of the program and the low rate of overstaying have already led to this policy being heralded as international best practice. The large development impacts seen here should further foster the case for other countries to consider similar policies.

Nevertheless, there are several caveats to these conclusions. The first is that development is a long-term process, and some of the effects of the RSE may only materialize over many years of community involvement. These could include positive effects such as greater asset-building, investments and skill development if workers return for many seasons, as well as potential longer-term negative effects of continual absence of family members on family and community relations. Secondly, while the gains to households from this seasonal migration are large, they still pale in comparison to the gains from permanent international migration (McKenzie et al, 2010). A key policy issue is therefore the extent to which seasonal migration can or cannot eventually open up avenues for permanent migration. Finally, as with all evaluations, there is the question of how far the policy details and findings can be extrapolated to other settings. The fact that New Zealand's program is sizeable by international standards (greatly exceeding Australia's fledging seasonal worker pilot and about one-third the size of Canada's SWAP program for example) and that it was developed drawing on lessons from experiences around the world should provide some external validity. As temporary migration programs are increasingly emphasized in policy discussions, there is likely to be plenty of scope for Governments and researchers to work together in the future in assessing how well these lessons translate.

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Appendix: Robustness to Attrition in the Vanuatu sample

There was almost no attrition in the Tongan sample. In contrast, 16.7 percent of the PS-2 screened Vanuatu sample had attrited by the final wave. The attrition rate was slightly higher for the non-RSE households (19.3 percent) than for the RSE households (13.7 percent), although this difference is not significant. Attrition is significantly associated with lower baseline asset levels and lower baseline per capita income. This is consistent with the observations from the field, whereby some poor non-RSE households told our enumerators that their lives had not changed at all, so that they refused to answer the same questions again and again.

Given our estimation is based on difference-in-differences, attrition will only bias our results if it is associated with changes in outcomes, not levels. A first test of this is to see whether the change in income between rounds 1 and 2 is associated with whether or not the household then appears in the final wave (round 4). A probit examining this finds no significant relationship (p=0.64). A second approach is to construct Lee (2009) bounds on the size of the treatment effect. The key identifying assumption for implementing these bounds is a monotonicity assumption that participation in the RSE affects sample selection only in one direction. Since non-RSE households are more likely to attrit, this amounts to assuming that no household who attrits when in the RSE would have not attrited had they not participated in the RSE. This appears reasonable to a first-order, although may be violated for the small number of households in which divorce occurred.

We then construct a lower bound for the RSE treatment effect by trimming out the top 7 percent of RSE households in terms of changes in per capita income between round 1 and round 4. This would be the treatment effect under the unlikely scenario that it was the non-RSE households who experienced large positive income shocks who decided to attrit. Using the PS-2 screened sample, we get difference-in-differences point estimates of 27,822 vatu (p=0.02) for the effect on per capita income, and 0.301 (p=0.01) for the effect on log per capita income. An upper bound

can likewise be formed by eliminating the 7 percent of RSE households with the smallest (most negative) income change between round 1 and round 4. Doing this yields a 53,354 vatu (p=0.001) effect for per capita income and 0.399 (p=0.001) effect for log per capita income. These bounds are thus quite tight, and show that the large increase in income in Vanuatu from the RSE is robust to attrition.

Table 1: Means of Baseline Characteristics of Households

	TONGA				VANUATU			
			Non-RSE with				Non-RSE with	
	RSE Households	All Non-RSE Households	PS-1 in [0.1, 0.9]	PS-2 in [0.1, 0.9]	RSE Households	All Non-RSE Households	PS-1 in [0.1, 0.9]	PS-2 in [0.1, 0.9]
Household Size	5.70	4.82***	5.08**	5.05	4.72	4.83	4.68	4.71
Number of Males 18 to 50	1.50	1.25***	1.34*	1.37	1.25	1.21	1.23	1.17
Share of Male 18 to 50s that:								
Are Literate in English	0.92	0.85**	0.90	0.89	0.85	0.70***	0.79	0.75**
Have more than 10 Years Schooling	0.46	0.49	0.52	0.52	0.06	0.07	0.06	0.05
Have very good self-reported health	0.68	0.60*	0.63	0.59	0.83	0.69***	0.77	0.70***
Drank alcohol in last month	0.42	0.39	0.42	0.46	0.52	0.55	0.56	0.53
Mean days hard labor in past week males 18 to 50	4.56	3.97***	4.19*	4.04	3.05	3.38	3.37	3.35
Share of Adults who previously have worked or studied in NZ	0.38	0.20***	0.23***	0.21***	0.08	0.01***	0.01***	0.00***
Number of Relatives in NZ	5.41	4.80*	4.87	4.64	0.10	0.06	0.03*	0.05
Household Durable Assets Index	0.07	-0.06	0.01	-0.15	0.60	-0.29***	-0.12***	-0.48**
Number of Pigs	5.57	5.49	5.40	5.12	3.82	3.42	3.62	3.37
Number of Chickens	5.11	5.12	5.12	4.69	9.99	12.75*	11.72	11.73
Number of Cattle	0.45	0.47	0.42	0.44	1.39	1.73	1.72	1.32
Have a traditional-style Dwelling	0.15	0.13	0.10	0.14	0.70	0.75	0.75	0.78
Located on Tongatapu or Efate	0.81	0.80	0.83	0.83	0.46	0.33**	0.38	0.33
Semi-annual per capita income (pa'anga or vatu)	979	1342***	1142	1103	85282	71961	69805	72442
Semi-annual per capita consumption (pa'anga or vatu)	829	1184***	948*	978	65872	55462*	58953	60909
Proportion with income per capita below US$1 per day	0.19	0.12**	0.14	0.17	0.19	0.21	0.20	0.20
Proportion with income per capita below US$2 per day	0.49	0.36***	0.41	0.44	0.37	0.44	0.43	0.45
Had a male aged 18 to 50 work for pay in early 2007	0.21	0.27	0.26	0.25	0.41	0.35	0.34	0.28**
Sample Size	**197**	**251**	**196**	**121**	**147**	**309**	**231**	**146**

Notes: *, **, and *** indicate that differs in mean from the RSE households at the 10%, 5% and 1% levels respectively.
PS-1 and PS-2 are the two propensity-score matched groups. See text for details.
For the PS-1 and PS-2 comparisons, this test of difference in means compares to the RSE households which also have propensity score in the [0.1, 0.9] range.

Table 2: Average Impact of RSE Migration on Household Income and Expenditure in Tonga

		Difference-in-Differences				Fixed Effects			
	Baseline Mean	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Outcome Variable:	for RSE households	All	PS-1	PS-2	PS-2-Trim	All	PS-1	PS-2	PS-2-Trim
PANEL A: IMPACT OF EVER BEING IN THE RSE									
Per Capita Income	979	331.0***	278.4***	233.1*	325.3***	347.4***	271.0***	248.7**	300.1***
		(99.30)	(105.3)	(129.5)	(90.92)	(87.50)	(87.78)	(106.2)	(80.56)
Log per Capita Income	6.57	0.355***	0.346***	0.290***	0.331***	0.383***	0.355***	0.324***	0.350***
		(0.0708)	(0.0767)	(0.0935)	(0.0865)	(0.0656)	(0.0697)	(0.0840)	(0.0802)
Per Capita Expenditure	829	224.1**	127.1	104.6	142.4**	249.8**	117.8*	133.0	145.0**
		(111.6)	(81.77)	(104.1)	(63.13)	(111.5)	(65.56)	(82.17)	(61.70)
Log per Capita Expenditure	6.58	0.124**	0.117**	0.0834	0.106*	0.128***	0.0926*	0.0900	0.103*
		(0.0520)	(0.0538)	(0.0662)	(0.0584)	(0.0481)	(0.0506)	(0.0595)	(0.0560)
PANEL B: IMPACT PER MONTH'S DURATION IN RSE									
Per Capita Income	979	24.56***	23.49**	20.03*	27.45***	39.48***	35.06***	31.19***	33.94***
		(8.771)	(9.723)	(11.34)	(10.03)	(8.405)	(8.562)	(10.11)	(9.689)
Log per Capita Income	6.57	0.0326***	0.0350***	0.0329***	0.0360***	0.0459***	0.0469***	0.0449***	0.0462***
		(0.00697)	(0.00780)	(0.00895)	(0.00875)	(0.00729)	(0.00743)	(0.00878)	(0.00875)
Per Capita Expenditure	829	9.765	3.476	-0.126	3.722	15.78	2.632	1.170	2.194
		(8.638)	(7.625)	(9.458)	(8.195)	(9.848)	(6.120)	(7.147)	(6.763)
Log per Capita Expenditure	6.58	0.00257	0.00227	-0.00178	0.000140	0.00339	-0.00106	-0.00277	-0.00217
		(0.00583)	(0.00685)	(0.00820)	(0.00803)	(0.00504)	(0.00571)	(0.00626)	(0.00624)
Number of Observations		1,774	1,499	1,092	1,080	1,774	1,499	1,092	1,080
Number of Households		448	379	274	274	448	379	274	274

Notes: All outcomes are converted to 6 month values.

The Subsamples used are i) All: the full sample; ii) PS-1, the propensity-score screened subsample; iii) PS-2, the propensity-score screened subsample restricted to RSE applicant households only; and iv) PS-2 after trimming observations above the 99th percentile for the full sample.

Robust standard errors in parentheses, clustered at the household level, *** p<0.01, ** p<0.05, * p<0.1

Table 3: Average Impact of RSE Migration on Household Income and Expenditure in Vanuatu

		Difference-in-Differences				Fixed Effects			
	Baseline Mean	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Outcome Variable:	for RSE households	All	PS-1	PS-2	PS-2-Trim	All	PS-1	PS-2	PS-2-Trim
PANEL A: IMPACT OF EVER BEING IN THE RSE									
Per Capita Income	85282	42,861***	44,441***	48,241***	24,491***	29,522*	32,760**	37,717**	17,489*
		(15,201)	(15,659)	(16,388)	(8,291)	(15,585)	(14,938)	(15,389)	(9,400)
Log per Capita Income	10.73	0.320***	0.301***	0.364***	0.310***	0.186*	0.167	0.267**	0.227*
		(0.104)	(0.107)	(0.116)	(0.115)	(0.109)	(0.109)	(0.121)	(0.120)
Per Capita Expenditure	65872	8,495	12,353**	13,020**	9,289*	1,093	2,228	2,978	1,213
		(6,590)	(6,131)	(5,559)	(5,195)	(5,761)	(6,217)	(5,912)	(5,777)
Log per Capita Expenditure	10.63	0.240***	0.261***	0.254***	0.227***	0.134*	0.137*	0.132*	0.125
		(0.0745)	(0.0778)	(0.0761)	(0.0766)	(0.0746)	(0.0806)	(0.0799)	(0.0805)
PANEL B: IMPACT PER MONTH'S DURATION IN RSE									
Per Capita Income	85282	3,382*	4,992**	5,219**	2,273**	3,391	5,066**	5,964**	2,694**
		(1,862)	(2,102)	(2,109)	(1,119)	(2,307)	(2,572)	(2,615)	(1,080)
Log per Capita Income	10.73	0.0366***	0.0466***	0.0501***	0.0432***	0.0284**	0.0364***	0.0488***	0.0431***
		(0.0133)	(0.0148)	(0.0150)	(0.0147)	(0.0126)	(0.0135)	(0.0140)	(0.0137)
Per Capita Expenditure	65872	1,006	2,225**	2,023**	1,574**	660.3	1,531**	1,504**	1,194*
		(936.8)	(865.7)	(825.3)	(782.7)	(740.4)	(766.1)	(734.7)	(694.1)
Log per Capita Expenditure	10.63	0.0233**	0.0351***	0.0321***	0.0284**	0.0162*	0.0258**	0.0236**	0.0222**
		(0.0105)	(0.0114)	(0.0115)	(0.0114)	(0.00942)	(0.0101)	(0.00991)	(0.00993)
Number of Observations		1,574	1,225	977	967	1,574	1,225	977	967
Number of Households		456	360	269	269	456	360	269	269

Notes: All outcomes are converted to 6 month values.

The Subsamples used are i) All: the full sample; ii) PS-1, the propensity-score screened subsample; iii) PS-2, the propensity-score screened subsample restricted to RSE applicant households only; and iv) PS-2 after trimming observations above the 99th percentile for the full sample.

Robust standard errors in parentheses, clustered at the household level, *** p<0.01, ** p<0.05, * p<0.1

Table 4: Impact of RSE participation on household assets and Subjective Standard of Living 2 years later

	TONGA				VANUATU			
	Ever in RSE		Duration		Ever in RSE		Duration	
Asset	PS-1	PS-2	PS-1	PS-2	PS-1	PS-2	PS-1	PS-2
Subjective Standard of Living	0.431***	0.427***	0.0574***	0.0590***	0.825***	0.712***	0.0807***	0.0672***
	(0.0940)	(0.114)	(0.0106)	(0.0127)	(0.198)	(0.194)	(0.0199)	(0.0190)
Made any dwelling improvement	0.106***	0.108**	0.0225***	0.0243***	0.0749	0.0839*	0.00969**	0.0109**
	(0.0391)	(0.0450)	(0.00480)	(0.00554)	(0.0458)	(0.0492)	(0.00412)	(0.00427)
Household Bank Account	0.0956**	0.140***	0.0100***	0.0137***	0.180***	0.168***	0.0135**	0.0119**
	(0.0373)	(0.0462)	(0.00377)	(0.00459)	(0.0562)	(0.0608)	(0.00578)	(0.00602)
Made any major asset purchase	0.163***	0.113**	0.0148***	0.00913	0.299***	0.268***	0.0318***	0.0269***
	(0.0426)	(0.0521)	(0.00492)	(0.00588)	(0.0593)	(0.0629)	(0.00645)	(0.00677)
Pigs	-0.202	-0.193	-0.00378	-0.0184	-1.031	-0.0802	-0.0809	-0.0240
	(0.225)	(0.303)	(0.0260)	(0.0327)	(0.715)	(0.443)	(0.0564)	(0.0407)
Cattle	0.0354	0.0407	0.00288	-0.00167	0.199	0.416	0.0516	0.0697
	(0.0654)	(0.0891)	(0.00670)	(0.00813)	(0.506)	(0.496)	(0.0613)	(0.0605)
Chickens	-0.164	-0.169	-0.0351	-0.0360	-7.203	-0.225	-0.629	-0.0171
	(0.262)	(0.318)	(0.0275)	(0.0329)	(5.960)	(1.381)	(0.532)	(0.141)
Cellphone	0.0563*	0.0611	0.00904**	0.0110**	-0.0284	-0.0374	0.00214	0.00165
	(0.0334)	(0.0435)	(0.00367)	(0.00454)	(0.0450)	(0.0469)	(0.00363)	(0.00367)
Radios/Stereos	0.0445*	0.0275	0.00501**	0.00386	0.288***	0.261***	0.0293***	0.0272***
	(0.0229)	(0.0282)	(0.00230)	(0.00265)	(0.0601)	(0.0651)	(0.00610)	(0.00642)
Television Sets	0.0794***	0.0736**	0.00965***	0.00883***	0.0320	-0.0214	0.00122	-0.00322
	(0.0273)	(0.0349)	(0.00249)	(0.00295)	(0.0498)	(0.0534)	(0.00510)	(0.00530)
DVD Player	0.0543	0.0740*	0.00286	0.00297	0.190***	0.235***	0.0194***	0.0252***
	(0.0349)	(0.0423)	(0.00364)	(0.00435)	(0.0591)	(0.0643)	(0.00638)	(0.00679)
Computer	0.000151	-0.00176	0.000125	-0.000207	0.0666*	0.0623*	0.0123***	0.0115**
	(0.0110)	(0.0141)	(0.000929)	(0.00116)	(0.0340)	(0.0327)	(0.00466)	(0.00458)
Gas or electric oven	0.0868**	0.117**	0.00815**	0.00982**	0.102**	0.125***	0.00881*	0.00941**
	(0.0374)	(0.0461)	(0.00378)	(0.00448)	(0.0451)	(0.0432)	(0.00482)	(0.00460)
Kerosene Cooker	-0.0804***	-0.0946***	-0.00612**	-0.00679*	0.0345	-0.000831	0.00277	0.000248
	(0.0274)	(0.0363)	(0.00311)	(0.00375)	(0.0242)	(0.0197)	(0.00245)	(0.00223)
Boats	0.0018	0.000	0.0002	(0.000)	0.111**	0.0827*	0.0137***	0.0113**
	(0.0022)	(0.000)	(0.0003)	(0.000)	(0.0447)	(0.0466)	(0.00514)	(0.00517)
Bicycles	0.0686*	0.0853*	0.00482	0.00595	0.0511	0.0381	0.00666	0.00532
	(0.0362)	(0.0473)	(0.00389)	(0.00484)	(0.0394)	(0.0400)	(0.00451)	(0.00452)
Cars or Pick-up trucks	0.0524	0.0767	0.00312	0.00352	0.0188	0.00625	0.00151	0.000566
	(0.0408)	(0.0496)	(0.00449)	(0.00551)	(0.0223)	(0.0223)	(0.00210)	(0.00203)
Number of Households	372	271	372	271	268	224	268	224

Notes:

All asset regressions and bank account regression control for baseline asset levels

Robust standard errors shown in parentheses

Table 5: Impact of the RSE on Children's School Attendance in Final Round survey

	Aged 6 to 14 at Baseline			Aged 15 to 18 at Baseline		
	Full Sample	PS-1	PS-2	Full Sample	PS-1	PS-2
Panel A: Tongan Children						
Household is ever in the RSE	-0.004	-0.004	-0.005	0.129**	0.136**	0.094
	(0.004)	(0.004)	(0.005)	(0.059)	(0.063)	(0.083)
Number of Months in the RSE	-0.001	-0.001	-0.002	0.010	0.017**	0.013
	(0.001)	(0.001)	(0.002)	(0.006)	(0.007)	(0.009)
Number of Observations	478	414	286	167	144	97
Proportion of non-RSE students attending school	0.983	0.984	0.977	0.603	0.599	0.576
Panel B: ni-Vanuatu Children						
Household is ever in the RSE	-0.022	-0.053	-0.033	-0.032	0.022	0.013
	(0.048)	(0.056)	(0.063)	(0.107)	(0.123)	(0.127)
Number of Months in the RSE	-0.002	-0.005	-0.002	-0.007	-0.003	-0.006
	(0.005)	(0.006)	(0.006)	(0.011)	(0.012)	(0.011)
Number of Observations	344	261	219	101	71	60
Proportion of non-RSE students attending school	0.813	0.816	0.790	0.384	0.397	0.370

Notes:
Results show regression coefficients after controlling for baseline school attendance and age
Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 6: Qualitative impressions of the broader impacts of the RSE

	TONGA			VANUATU		
	Better	No change	Worse	Better	No change	Worse
Opinions of RSE workers						
Percent who think involvement in RSE:						
Made Family Life (at 1 year)	81.8	11.9	6.3	48.6	50.0	1.4
Made Community Life (at 1 year)	83.0	15.9	1.1	27.1	70.0	2.9
Opinions of non-RSE households in these communities						
Percent who think involvement of community members in RSE has:						
Made Community Life (at 6 months)	49.4	46.7	3.8	16.1	67.4	18.5
Made Community Life (at 2 years)	10.6	88.2	1.2	14.6	77.7	7.7
Made availability of paid jobs (at 6 months)	38.7	49.0	12.3	13.2	67.0	19.8
Made availability of paid jobs (at 2 years)	39.4	60.2	0.4	7.0	72.9	20.2
Made schooling opportunities for children in the community (at 6 months)	18.4	77.0	4.6	27.2	64.1	8.7
Made schooling opportunities for children in the community (at 2 years)	52.9	47.2	0.0	12.4	72.9	14.7
Opinions of Community Leaders						
Percent who think involvement of community members in RSE has:						
Made Community Life (at 1 year Tonga/6 months Vanuatu)	3.0	97.0	0.0	32.6	41.8	25.4
Made Community Life (at 2 years)	68.0	25.3	6.7			
Made availability of paid jobs (at 1 year Tonga/6 months Vanuatu)	2.0	98.0	0.0	29.1	70.9	0.0
Made availability of paid jobs (at 2 years)	89.3	10.7	0.0			
Made schooling opportunities for children in the community (at 1 year Tonga/6 months Vanuatu)	10.0	90.0	0.0	24.1	74.1	1.9
Made schooling opportunities for children in the community (at 2 years)	69.3	26.7	4.0			
	Positive	No effect	Negative	Positive	No effect	Negative
Community leader perception of overall impact for the community (at 6 months)				72.2	13.0	14.8
Community leader perception of overall impact for the community (at 1 year)	98.3	0.0	1.7			
Community leader perception of overall impact for the community (at 2 years)	92.0	2.7	5.3			